

Claims 1-30 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The points raised by the Examiner are dealt with serially.

(A) As to all the claims, the Examiner considers Claim 1 to be indefinite in its recital in step (b) "for a determinate period of time".

Claim 1 is amended to delete "determinate".

(B1) As to Claims 6 and 7, the Examiner considers these claims to be indefinite because Claim 6 utilizes the same letters (a-d) as Claim 1 to designate different processing steps.

Claim 6 is amended to conform the steps to Claim 1 and to designate sub-steps appropriately.

(B2) Further, the Examiner considers it unclear as to whether or not the steps of "subjecting the organic coating ... to a precursor chemical or physical treatment" (Claim 1) and "treating said substrate to said precursor chemical or physical treatment (Claim 6) are the same.

Claim 6 is amended to be consistent with Claim 1.

(B3) The Examiner also considers these claims to be indefinite because the term "an appropriate time" (Claim 6) is relative in nature lacking proper comparative basis, and it is further unclear whether or not this "appropriate time" and "a determinate period of time" recited in Claim 1 are the same.

Claim 6 is amended to be consistent with Claim 1.

(C) As to Claims 8-10, the Examiner considers these claims to be indefinite because Claim 8, as written, requires the recited "treatment" to consist of exposure to chemically active process gases, chemically inert process gases, and solvents together, due to the language used in the Markush grouping.

Claim 8 is amended to clarify the Markush grouping so that the recited treatment consists of exposure to any of the listed items, based on the disclosure.

(D) As to Claim 9, the Examiner is not clear as to what is referenced as "said process gases", and asks whether "chemically active process gases" or "inert process gases" are meant.

Claim 9 is amended to specifically recite "chemically active process gases" and "chemically inert process gases".

(E1) As to Claim 14, the Examiner considers "suitable" to be indefinite on the basis that it is relative in nature lacking proper comparative basis.

Claim 14 is amended to delete "suitable".

(E2) Further, it is not clear to the Examiner whether the "electromagnetic radiation" must include UV radiation or the recitation of UV radiation is a narrow limitation following a broad limitation recited electromagnetic radiation.

UV radiation, while it is encompassed by electromagnetic radiation, is separately recited, since UV radiation is a significant sub-set of electromagnetic radiation. In this connection, heat, laser energy, and sound energy are also sub-sets of electromagnetic radiation, and are separately recited. Claim 14 is amended to clarify this point.

(F) As to Claims 15-19, the Examiner considers these claims to be indefinite for the same reasons as Claim 8.

Claim 15 is amended analogously as Claim 8.

(G) As to Claim 18, the Examiner considers this claim to be indefinite for the same reasons as Claim 14.

Claim 18 is amended analogously as Claim 14.

(H) As to Claims 20-22, the Examiner considers these claims to be indefinite because it is not clear how "chemical or physical treatment" can be selected from gases, vapors, solvents, etc.

Claim 20 is amended to replace the phrase "chemical or physical treatment" with the term --component--.

Claim 20 is also amended analogously as Claim 14.

(I) As to Claims 16 and 21, the Examiner considers these claims to be indefinite for the same reasons as Claim 14.

Claims 16 and 21 are amended analogously as Claim 14.

(J1) As to Claim 22, the Examiner is unclear as to how the step of subjecting a substrate to "a vapor consisting essentially of water-free gaseous sulfur trioxide" can be conducted simultaneously with subjecting the substrate to vaporized water. It is believed that the Examiner is referring here to Claim 20, not Claim 22, and the comments are so directed.

The Examiner is correct, and "steam" is deleted from Claim 21, while "water" is deleted from Claim 22, on the basis that the exposure to SO₃ must be in a water-free environment.

(J2) The Examiner notes that the language "consisting essentially of" in Claim 1 is not consistent with the requirement in Claim 22 regarding chemically active process gases and vapors and vaporized solvents. It is believed that the Examiner is referring here to Claim 20, not Claim 22, and the comments are so directed.

The term "consisting essentially of" in Claim 1 refers to the water-free SO₃ vapor. Step (b), however, is part of a method "comprising" the four recited steps. Claim 20 is amended to recite that step (b) "further comprises" subjecting the coatings, etc. to one of the listed treatments.

(K) As to Claim 24, the Examiner considers this claim to be indefinite because it is not clear what is referenced as "certain organo-metallic complexes".

The limitations of Claim 24 are incorporated into Claim 1, without the word "certain".

(L) As to Claims 26-29, the Examiner considers Claims 26 and 29 to be indefinite for the same reasons as Claim 8.

Claims 26 and 29 are amended analogously as Claim 8. Claim 29 is also amended analogously as Claim 14.

Reconsideration of the rejection of Claims 1-30, as amended, under 35 USC 112, second paragraph, is respectfully requested.

Claims 1-30 are rejected under 35 USC 102(b) as being anticipated by Settineri et al (U.S. Patent 4,363,673). Claims 2 and 24 are canceled.

Settineri et al disclose a process for the removal of carbon from solid surfaces, such as metal or glass, by contacting the surface with sulfur trioxide and thereafter rinsing the surface.

Applicants' independent Claim 1, as amended, recites a method for partially or completely removing organic coatings, films, layers or residues from a substrate, wherein the organic coatings, films, layers and residues are selected from the group consisting of photosensitive and non-photosensitive organic materials, polymerized photoresists, paints, resins, single and multilayer organic polymers, organo-metallic complexes, positive optical photoresist, negative optical photoresist, electron-beam photoresists, X-ray photoresists, ion-beam photoresists, ion-implanted photoresists, and other hardened photoresists and wherein the sub-

strate is selected from the group consisting of semiconductor devices and wafers, ceramic devices, liquid crystal display devices, flat-panel displays, printed circuit boards, magnetic read/write heads, thin-film read/write heads. The method comprises:

(a) subjecting the organic coatings, films, layers, or residues to a precursor chemical or physical treatment;

(b) subjecting the organic coatings, films, layers, or residues to a vapor consisting essentially of water-free gaseous sulfur trioxide for a period of time, the substrates being maintained at a temperature in the range from about room temperature to 400°C;

(c) subjecting the organic coatings, films, layers, or residues to a solvent rinse; and

(d) subjecting the organic coatings, films, layers, or residues to a chemical or physical post-rinse treatment.

Claims 3-23 and 25-30 depend either directly or indirectly from Claim 1 and are directed to various preferred embodiments of Applicants' method.

The Examiner contends that Settineri et al teach a method for removing organic compounds from substrates, including metal and ceramic (glass) substrates, the method comprising subjecting the substrates to a vapor of water-free sulfur trioxide alone or in mixture with other gases such as nitrogen. The Examiner further contends that the subjecting step is conducted at the claimed temperatures, and the contact times disclosed by the reference are within the claimed region. The Examiner further contends that the subjecting step is conducted after a pre-treatment such as heating and/or flushing with gases such as nitrogen. The Examiner additionally contends that the sulfur trioxide treatment is followed by a step of subjecting substrates to a gas stream (nitrogen) to remove sulfur trioxide. At some embodiments, this step is conducted at the same elevated temperature as the sulfur trioxide treatment. The Examiner also contends that after removing sulfur trioxide, the substrates are subjected to one or more rinsing steps, and that the rinsing agents are the same as claimed. The Examiner further contends that the substrates are subjected to kinetic energy (stirring) during rinsing, and that the rinsed substrates are subjected to a drying process, such as nitrogen drying. The Examiner notes that the use of kinetic energy in post rinse treatment is inherently disclosed by the disclosure of nitrogen drying, because nitrogen streams used for drying would apply kinetic energy to substrates.

Settineri et al disclose removal of residual carbon from the surfaces of solid, or bulk, materials, such as metal or glass. For example, steel *plate* or *sheet* has residual organic compounds on the surfaces thereof which come from lubricants used in rolling the metal. (Col. 1, lines 7-14).

According to Settineri et al, the carbon is present in the form of various organic compounds or inert, zero valence carbon (amorphous or graphitic). The organic compounds come from greases or oils left on the surface from prior processing. The inert carbon is generated from the decomposition of the organic compounds as a result of heat treatment of the solid surface. (Col. 1, lines 31-37).

Applicants' invention is directed to the removal of coatings, films, layers, or residues from a substrate. The organic coatings, films, layers, and residues are selected from the group consisting of photosensitive and non-photosensitive organic materials, polymerized photoresists, paints, resins, single and multilayer organic polymers, organo-metallic complexes, positive optical photoresist, negative optical photoresist, electron-beam photoresists, X-ray photoresists, ion-beam photoresists, ion-implanted photoresists, and other hardened photoresists, while the substrate is selected from the group consisting of semiconductor devices and wafers, ceramic devices, liquid crystal display devices, flat-panel displays, printed circuit boards, magnetic read/write heads, thin-film read/write heads.

Settineri et al fail to disclose or suggest the removal of such specific coatings, films, layers, or residues from such specific substrates. Claim 1 is amended to emphasize this distinction over Settineri et al by incorporating therein the limitations of Claims 2 and 24. It is not at all obvious that the process of Settineri et al, which is directed to removal of greases and oils or graphitic carbon from sheet or bulk metal (steel and aluminum) or glass surfaces, could be used in the processing of microelectronics-related devices. That is to say, a process used for "macro" cleaning cannot be considered to be useful for "micro" cleaning, without some additional teaching in the reference to suggest such utility. If the Examiner were to consider that it would be obvious to try such a process for "micro" cleaning, the Examiner is cautioned that the "obvious to try" test has been repeatedly rejected by the Federal Circuit.

As is well-recognized, "[a]nticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim. ... A prior art disclosure that

'almost' meets that standard does not 'anticipate.' *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548, 220 USPQ 193, 198 (Fed. Cir. 1983). As noted above, Settineri et al fail to disclose or even remotely suggest removal of Applicants' specifically-recited coatings, films, layers, and residues from Applicants' specifically-recited substrates.

Applicants assert that Settineri et al in fact do not anticipate their claims nor does this reference even remotely suggest their claims, and thus Applicants' claims are not only novel over Settineri et al, but are also unobvious thereover.

With regard to the Examiner's statement that Settineri et al disclose a pretreatment comprising heating and/or flushing with nitrogen, Applicants note that their Claim 6 still requires a separate precursor chemical or precursor physical treatment.

With regard to the Examiner's statement that Settineri et al disclose a pretreatment comprising heating and/or flushing with nitrogen, Applicants note that their Claim 6 still requires a separate precursor chemical or precursor physical treatment prior to heating and/or flushing with nitrogen as disclosed in Settineri. Applicants' pre-treatment discloses the use of several techniques to modify the organic film to make that film more susceptible to the mechanism of sulfur trioxide prior to the application of heat and/or flushing with nitrogen disclosed by Settineri et al.

Further, Settineri et al do not disclose the requirement for post-rinse treatments for the purpose of improving the susceptibility of the organic film to removal by various techniques disclosed by Applicants. Settineri et al's disclosure of the use of passivating solutions as part of the rinse are specified as a means of providing a stable surface after cleaning (Col. 2, lines 47-48).

Finally, Settineri et al do not disclose the requirement for a treatment to be made simultaneously with exposure to sulfur trioxide for the purpose of effectiveness. Settineri et al's disclosure of the use of nitrogen is specified as a means of merely allowing the sulfur trioxide mechanism to function (Col. 1, line 42-45).

Reconsideration of the rejection of Claims 1, 3-23 and 25-30, as amended, under 35 USC 102(b) as being anticipated by Settineri et al is respectfully requested.

The Examiner cites Levenson et al (U.S. Patent 5,763,016), Kato et al (U.S. Patent 5,952,157), and Settineri et al (U.S. Patents 4,455,175 and 4,536,2220 to show the state of the prior art with respect to cleaning methods using sulfur trioxide. Applicants have reviewed these

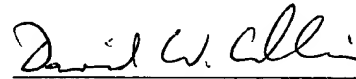
references and consider that they neither disclose nor suggest Applicants' claimed invention, whether taken alone, in any reasonable combination with each other, or in any reasonable combination with the above-discussed references.

The foregoing amendments and arguments are submitted to place the application in condition for allowance. The Examiner is respectfully requested to take such action. If the Examiner has any questions, he is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,

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